

# 9-5 Study Guide and Intervention

## Scientific Notation

**Scientific Notation** Numbers like 5,000,000 and 0.0005 are in **standard form** because they do not contain exponents. A number is expressed in **scientific notation** when it is written as a product of a factor and a power of 10. The factor must be greater than or equal to 1 and less than 10.

By definition, a number in scientific notation is written as  $a \times 10^n$ , where  $1 \leq a < 10$  and  $n$  is an integer.

**Example 1**

Express each number in standard form.

a.  $6.32 \times 10^5$

$$\begin{aligned} 6.32 \times 10^5 &= 6.32 \times 100,000 \\ &= \underline{\underline{632,000}} \end{aligned}$$

$$10^5 = 100,000$$

Move the decimal point 5 places to the right.

b.  $7.8 \times 10^{-6}$

$$\begin{aligned} 7.8 \times 10^{-6} &= 7.8 \times 0.000001 \\ &= \underline{\underline{0.0000078}} \end{aligned}$$

$$10^{-6} = 0.000001$$

Move the decimal point 6 places to the left.

**Example 2**

Express each number in scientific notation.

a. 62,000,000

To write in scientific notation, place the decimal point after the first nonzero digit, then find the power of 10.

$$\begin{aligned} \underline{\underline{62,000,000}} &= 6.2 \times 10,000,000 \\ &= 6.2 \times 10^7 \end{aligned}$$

The decimal point moves 7 places.

The exponent is positive.

b. 0.00025

$$\begin{aligned} \underline{\underline{0.00025}} &= 2.5 \times 0.0001 \\ &= 2.5 \times 10^{-4} \end{aligned}$$

The decimal point moves 4 places.

The exponent is negative.

## Exercises

Express each number in standard form.

1.  $4.12 \times 10^6$

2.  $5.8 \times 10^2$

3.  $9.01 \times 10^{-3}$

4.  $6.72 \times 10^{-7}$

5.  $8.72 \times 10^4$

6.  $4.44 \times 10^{-5}$

7.  $1.034 \times 10^9$

8.  $3.48 \times 10^{-4}$

9.  $6.02 \times 10^{-6}$

Express each number in scientific notation.

10. 12,000,000,000

11. 5000

12. 0.00475

13. 0.00007463

14. 235,000

15. 0.000377

16. 7,989,000,000

17. 0.0000403

18. 13,000,000